WTCI-718-P

THE PORT AUTHORITY OF NY & NJ

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April 15, 2009

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SUBJECT: NISTIR 7563 – BEST PRACTICE GUIDELINES FOR STRUCTURAL FIRE RESISTANCE DESIGN OF CONCRETE AND STEEL BUILDINGS – DRAFT COMMENTS

Dear Dr. Sunder:

I would like to compliment you, your staff and the individual contributors for the tremendous effort in preparing the draft guidelines that were released in February 2009. Providing engineers with a greater understanding of structural design for fire safety is an important goal. To that end, I offer the following comments:

1. The Abstract section should also express what is stated in the last paragraph on page 3: "*These best practice guidelines are a non-consensus, non-mandatory document. As a non-mandatory document, it does not represent a minimum standard of care.*"
2. Readers should be advised to compare fire resistance designs determined using performance based fire engineering against the minimum level of protection required by prescriptive codes and to use the more stringent of the two.
3. The objectives for safety of occupants, first responders and property protection need to be further developed for a range of fire hazards. The guidelines suggest that different building uses/occupancies or portions of buildings with different building uses/occupancies require different fire scenarios. It further suggests that areas in a building with different architecture or construction types (including areas with or without windows) would also require a different fire scenario. Fire resistance analysis for a performance based design requires highly special skills and competency for practicing engineers and architects to effectively perform. It also involves an informed <u>owner</u> because there are liability issues in selecting the performance objectives, acceptable risk and investment threshold. Since the theme of the guideline is to provide a more performance based approach to fire safe structural design, more guidance should be provided to the owner and design professional to enable them to make informed decisions regarding the level of performance needed Active and informed performance related specifications provided by the owner would help ease designer's concerns regarding accepting additional professional liability by using a performance based approach. For example:
   - For high rise buildings, as a minimum, the building should remain stable until all occupants have safely evacuated. (This is a given baseline.)
   - The owner then must decide whether the building should remain stable after complete burn out If so, should it be repairable?

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- The owner should decide the acceptable level of structural damage after complete burn out The owner's input will establish a more specific performance level beyond the general importance category, which is usually determined by the architect.

4. A large variable in performance based fire safe structural design is the assumed fuel. A performance based design guide should require input from the owner regarding the intended contents of the building A building designed using a performance based approach should be required to post content restrictions for various areas of the building In addition, building department officials will need to be able to determine whether the proposed design meets the proposed guidelines. Future changes due to tenant turnover may necessitate re-certification for compliance. The insurance industry may have reservations insuring buildings designed using this approach Therefore, the insurance industry should be consulted regarding the above issues related to these guidelines
5. Using a performance based design approach requires that validated fire size and growth data, associated with various initiating fire sources based on building type and occupancy, be available. This data should be accepted by the various organizations and industry, and available for the design engineer's use.
6. It was correctly assumed that the performance based approach does not benefit from the efforts of fire fighters to suppress the fire. However, any structural design guideline for fire safety should require communication among the owner, the engineer and first responders regarding the amount of burn time, after which, no one should be allowed to enter the building.
7. The guideline does not consider fire safety design trade off strategies between active and passive systems. The owner might wish to consider such strategies. Again, first responders will need to be advised regarding entering the building, should the active systems be disabled for any reason.
8. Even though the premise of the guideline is performance based design, a section should be added to provide prescriptive design solutions for engineers who opt to design using the prescriptive method. This section should provide guidance regarding protection of connections and other topics not commonly included in building codes.
9. Since the methods used to develop the fire scenarios and the resulting fire curves that yield the thermal effect on the structure and the "structural action due to the fire" or "T" do not appear to be well defined in any of the performance based design methodologies currently in use, we agree with *NIST* that more development and research needs to be performed at this time.
10. While the publication presents the current best information available on performance based design, it does not provide definitive guidelines for design. So the title, "Best Practice Guidelines ---------," might be misleading. May I suggest a similar title, such as: "Suggested Practices for Fire....

Please consider these comments in finalizing the report.

Sincerely,

Francis J Lombardi, P E.
Chief Engineer

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DOCUMENT DATA ENTRY FORM

KEYWORDS – HIGHLIGHT ALL THAT APPLY

Level 1

Bankers Trust	Project 2	WFC 1 - Oppenhiemer Dow	WTC 5 - North Plaza Bldg
Below grade	Project 3	WFC 2 - Tower B	WTC 6 - Customs House
Concourse	Project 4	WFC 3 - American Express	**WTC 7**
Electrical substation	Project 5	WFC 4 - Tower D	WTC Complex
Liberty Plaza	Project 6	**WTC 1 - North Tower**	WTC Plaza
PATH Station	Project 7	**WTC 2 - South Tower**	Add
PATH Terminal	Project 8	WTC 3 - Marriot Hotel	
Project 1	Restaurant	WTC 4 - South Plaza Bldg	

Level 2

Accident analysis & risk	Fire protection	Misc. performance problems	Tenant alterations
Architectural	Fire service	News coverage	Tenant space
Data request	Landscaping	Police	Add
Emergency management	Management	Security	
Evacuation	Mech./elec.	Structural	

Level 3

1993 explosion	Construction	Flag pole	Paint	Steel composition
1997 fire	Contract	Flammability	Partition layout	Stiffness
A/E fitout	Core beams	Floor	Partitions	Strap anchors
A-242	Core columns	Floor load	Photos	Structural review
A-36	Corrosion	Floor slab	Pipes	Surveillance
A-497	Cracking Cranes	Floor system	Plumbing	Survey
Aircraft contents	Criteria	Floor trusses	Prestressing	Survivor
Aircraft impact	Dampers	Formwork	Probability, uncertainty	Temporary
Air cooled condensers	Debris	Foundations	Quality control	Tenant list
Analysis	Deck	Fracture	Ramp	Tenant occupancy
Angles	Deflection	Frame	Reinforcing	Testing
Antenna	Demolition	Frame analysis	(strengthening)	Tie
Artifacts	Design	Frequency	Renovation	Tolerances
Asbestos	Detailing	Fuel	Repair	Transfer girders
Base plate	Disability access	Fuel distribution system	Research &	Triad
Beams	Doors	Furniture layout	Development	Truss
Bid documents	Drawings	Generators	Roof	Underground storage
Bid invitation	Eastern States Steel	Guidelines	Safety	tank
Bolts	Egress	Gypsum board	Schedule	Vestibule
Bow tie	Elevator	Hat truss	Sculpture	Vibration
Bracing	Elevator shaft	Human comfort	Security system	Victim
Bridging truss	Emergency	HVAC	Shear knuckle	Walls
Building code	communications	Index	Shear test	Water supply
Calculations	Equipment	Inspection	Shear stud	Weather
Carpet	Erection marks	Insulation	Shop drawings	Weight
Ceilings	Errors & Omissions	Job number	Shortening	Weld detail
Certification	Escalator	Joist	Slab	Weld size
Chillers	Expansion joint	L-50	Slurry wall	Welding
Cladding	Exterior columns	Lighting	Smoke control	Wind
Collapse	Fabrication	Loads	Smoke test	Windows
Columns	Family member	Maintenance	Spandrel beam	Window washer
Communication systems	Field survey	Marking	Specifications	Yield strength
Composite truss	Fire alarms	Mesh reinforcement	Splices	
Computer output	Fireproofing	Mill inspection	Sprinkler	Add
Computer program	Fire spread	Model	Stability	
Concrete	Fire testing	Mullion	Stairways	
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WTC-I000718-P

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Date on Document:	**Date Received by NIST:**	**Doc. ID:** (any ID numbers on the document, e.g., report #, contract #)
April 15, 2009	April 15, 2009	

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